neutral combination with sulphuric acid, and that the compound in its purest known form constitutes what has been called *oil of wine*; and that when in this state it is acted upon by certain salifiable bases, a portion of the hydrocarbon is thrown off, and a distinct set of neutral salts formed, which are resolvable by heat into bi-sulphates; and which therefore include *two* proportionals of the elements of sulphuric acid, *one* of proto-carburet of hydrogen, and one of base.

On a Method of expressing by Signs the Action of Machinery. By Charles Babbage, *Esq. F.R.S. Communicated January* 17, 1826. Read March 16, 1826. [*Phil. Trans.* 1826, *p.* 250.]

In the construction of an engine for calculating and printing mathematical tables, in which the author of this paper has been for some time occupied, he states himself to have met with considerable difficulty from the want of any method by which all those motions which take place in any machine at the same instant, may be easily perceived and referred to, and by which the movement of any part might readily be traced back, through all the intervening stages, up to the first mover of the machine. The usual modes of mechanical drawing he found quite insufficient for these purposes, except in machinery of the simplest construction; and, even if they had not altogether failed in more complicated cases, the time and expense required for their execution would have effectually prevented their employment.

The most important question was to contrive some method by which all the simultaneous movements, occurring at any moment, should be at once visible; and the history of the state of motion or rest of any given part should be apparent during the whole cycle of the action of the engine. The author had therefore recourse to a system of signs, which bear an analogy to those employed in algebra, whilst they differ from them by having a general resemblance to the things they are intended to represent. Having gradually found that this system, which he calls "mechanical notation," was readily susceptible of affording other information than that for which it was at first contrived, he was led to give to it additional extension.

In its present form it gives, almost at a glance of the eye, information relative to any of the following points.

The names of every part of any engine being written at the top of the paper:—

1. Its representations in all the drawings will be pointed out.
2. The number of teeth in any wheel, pinion, or sector will be seen.
3. The actual angular velocity will also appear.
4. The mean angular velocity will also appear.
5. The origin of the motion of each part will be seen, and thus the cause of its motion will be traced up to the first mover.
6. At each transfer of movement, the method by which it was

accomplished will become apparent; whether by wheel and pinion, by a stud, by stiff friction, or by any other method.

7. All the adjustments which are necessary in order to set the machine in action will be pointed out, and the order in which they ought to be made will be indicated.

8. The whole course of action of every part will be visible in every stage of the progress of the machine. If it is a wheel, the time and direction of its motions will appear, and also the times at which it rests; if the part is a bolt or click, the times at which it is bolted or locked, and those during which it is in the reverse state, will be seen. These particulars will be discovered by casting the eye down the vertical line belonging to each part, which was named at the top of the drawing.

9. In passing the eye along any of the horizontal lines, dividing the cycle of the engine movements, every cotemporaneous motion, as well as its direction, at that precise time becomes visible; as also the position of those parts which are at rest.

The author then proceeds to state, that he found much time to be saved in the construction of his calculating engine by employing this mechanical notation; and he has, by way of example, in this paper described its application to the hydraulic ram, and to the common eight-day clock, of both of which he has given the drawings and notation.

On the Parallax of the fixed Stars. *By* J. F. W. Herschel, *Esq. M.A. Sec. R.S. Communicated January* 19, 1826. Read March 9 and 16, 1826. [*Phil. Trans.* 1826, *p.* 266.]

The measurement of the distance between the two stars composing a double star, at opposite seasons of the year, has long ago been suggested as a means of detecting a difference of parallaxes between them, if any exist; but in practice has not proved delicate enough for the purpose, owing to the difficulty with which measures of distance are still attended when minute fractions of a second are to be determined. The author observes that it appears hitherto to have escaped notice that a difference of the parallaxes will affect not only their distance from each other, but also their angle of position, and that this latter effect is much more sensible and measurable for a given amount of parallax than the former; and he accordingly proposes it as a means of determining the question as to the existence or non-existence of a sensible difference, in all stars favourably situated.

He first enters into an estimate of the least amount of such difference which this method is capable of detecting, with our present instruments and methods of observation, which, for two stars at 3″ distance from each other, he states to be one fortieth of a second, and in closer stars a still smaller fraction.

In selecting stars for examination, the most favourable position in